Fig. 7 represents the appearance of (in the mirror) a carbonic-acid tube with the slit attached. This tube, viewed by the eye, shows flake-like fluttering striæ, with a slight tendency to flocculency near the head of the column. The commencement of the discharge is at the right hand, and the negative terminal at the top. The drawing fairly represents the appearance of the upper part or head of the column of striæ during one complete coil-discharge. When the battery-surface exposed is small, the whole consists of, first, three or four columns of striæ of decreasing length, and afterwards of an almost unbroken field of striæ. Each of the initial columns is perfectly stratified; and the same disposition of striæ prevails throughout the entire discharge. The striæ which fill the main part of the field present a proper motion, that is a motion along the tube during their period of existence, usually steady and towards the positive. In this case it is nearly uniform, but slightly diminishing towards

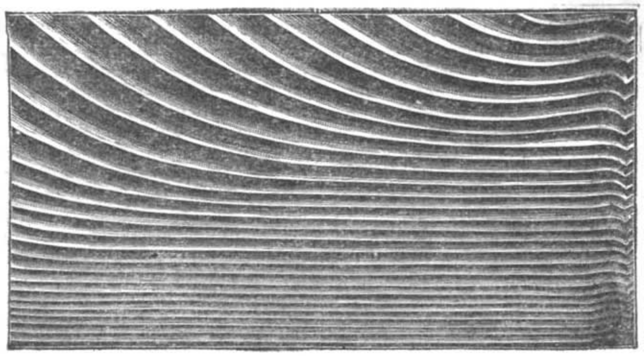

Fig. 8.

the end. These striæ are for the most part unbroken, but are occasionally interrupted at apparently irregular intervals. When the battery-surface is increased, the elementary striæ are more broken, and near the head of the column the interruptions occur as in the figure.

Fig. 8 represents the discharge in a hydrogen-tube of conical form, the diameter of which varied from capillary size to half an inch, the capillary end being at the bottom. The positive terminal is at the top. The principal interest of this tube consists in showing the influence of diameter upon the velocity of proper motion. The wider the tube the freer, it seems, the striæ are to move.

The same fact may be observed by comparing tubes differing in diameter, but in other respects the same; but the conical tube brings out the fact in the most striking manner.

Fig. 9 represents a chloroform-tube, in which a piece of

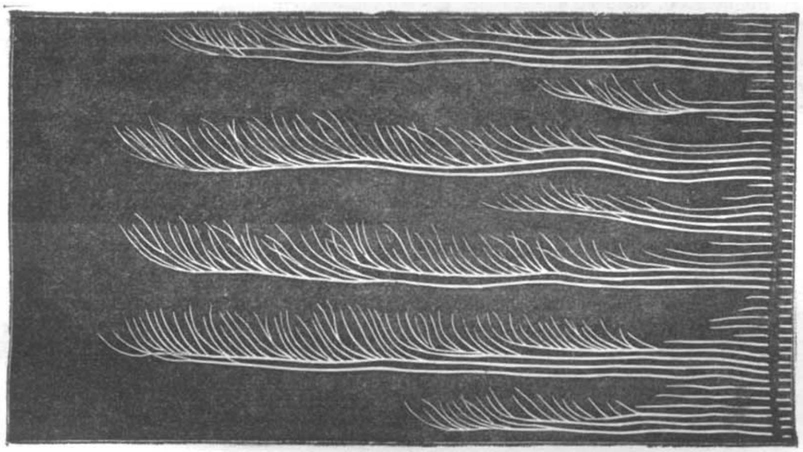

Fig. 9.

cotton-wool had been inserted with a view of ascertaining whether any motion would be communicated to it by the current. This proved to be the case; but I do not attempt here to describe the phenomenon. To the unassisted eye the discharge was extremely brilliant; it passed in a column not quite straight, but in a writhing, snake-like curve, with flaky striæ at intervals through its length. When viewed in the mirror the striæ were seen to spread themselves out with slight, but irregular, proper motion. With an increased battery-surface, or with a greater number of cells, but more notably with the latter, not only were the striæ lengthened, but from several of the long elementary striæ shorter ones were thrown out nearly at right angles to the former. These were of short duration, and had great proper motion. The general appearance of these compound striæ was that of branches of fir trees, the twigs of which represented the permanent striæ, and the leaves the secondary.

(To be continued.)

SOCIETIES AND ACADEMIES

Paris

Academy of Sciences, Sept. 19.—M. Wurtz in the chair.—The president gave a welcome to the foreign members of the International Congress of Electricity who were present, including Clausius, Clifton, Du Bois Reymond, Everett, Förster, Helmholtz, Kirchhoff, Melsens, Spottiswoode, Siemens (William and Werner), Smith, Stas, Thomson, Warren De La Rue, and Wartmann.—The following papers were read:—On the relative resistances that should be given, in dynamo-electric machines, to the active bobbins, the inductor electro-magnets, and the interior circuit, by Sir William Thomson.—On experiments made in 1826 on electric currents by lightning far from the place of observation,

and on recent studies of M. René Thury on sounds of telephones during thunderstorms, by M. Colladon. M. Thury stretched a copper wire horizontally between two houses at the height of the roofs, and connected it with the water pipes, and with two telephones. The telephones gave a characteristic sound each time and at the same instant as a flash of lightning was seen, near or far (and even when no thunder was heard). It was like the sound of a Swedish match rubbed on the box. M. Colladon, in 1826, observed deflections in a galvanometer in Paris during a thunderstorm at a distance, while there was no cloud within 30° of the zenith, and M. Peclet describes like inductive effects in his "Traité de Physique" (1832). M. Colladon thinks the sounds will be best heard in the telephone when the air is surcharged with humidity. The telephone affords an easy method of measuring the velocity of transmission of those influences.—Measurement of rotation of the plane of polarisation of light under the magnetic influence of the earth, by M. H. Becquerel. Repeating his experiments under more favourable conditions, he finds that the yellow rays D, traversing horizontally a column of 1 metre of sulphide of carbon at 0°, under the influence of terrestrial magnetism at Paris, and in a direction parallel to the declination needle, undergoes a simple magnetic rotation of 0'·8697 from right to left for an observer supposed to lie with his head towards the magnetic north. In the C.G.S. system of units this leads to the number $1·31 \times 10^{-5}$ as expressing the magnetic rotation of yellow rays through sulphide of carbon between two points of unit distance in a magnetic field equal to unity. (Mr. Gordon's figures, got by different methods, give $1·24 \times 10^{-5}$ for sodium light.)—On the passage of projectiles through resistant media, on the flow of solids and the resistance of air to the motion of projectiles, by M. Melsens. He arranged experiments with a view to catching the air carried in front of a projectile. Lead balls (about 0·017m. in diameter) were shot into a hollow cone in a block of iron, the apex being of steel, and having an opening, smaller than the ball, into a gun-barrel communicating with a bell-jar in a reservoir. The gun, the reservoir, and the bell-jar were filled with water, which was prevented escaping through the cone by a light obstacle of paper or thin brass. Detached fragments of the lead entered the gun-barrel, the bulk of the ball stopping the hole of the cone, and appearing pointed, or with an oblong drop. The effects of the penetrating air are indicated in the cracks and rupture of the gun-barrel, the bell-jar, and the bent tube between them. M. Melsens considers the resistance of the air implies factors of which artillery has not taken sufficient account. This resistance is variable throughout the trajectory, in virtue of the mass of the projectile, the form of the mass of adherent air, the velocity, the thrust of the powder-gases, up to a certain distance from the gun, and, lastly, from the very brief moment when the projectile is equally pressed in all directions by air.—On new sulphurised salts produced with sesquisulphide of phosphorus, by M. Lemoine.—On tungstoboric acid and its salts, by M. Klein.—Determination of phosphoric acid by titrated liquors, by M. Perrot.—On some of the scientific researches contained in the manuscripts of Leonardo da Vinci, by M. Ravaisson. He calls attention to a passage recommending, as a method of hearing distant sounds at sea or on land, inserting one end of a tube in the water or in the earth, and putting one's ear to the other. M. Ravaisson is preparing the manuscript B, one of twelve in the Bibliothèque de l'Institut, for publication (to follow MS. A, published in December last).

September 26.—M. Wurtz in the chair.—The following papers were read:—Researches on the gymnotus in Venezuela, by the late Dr. Sachs, by M. du Bois Reymond. At the instance of Prof. du Bois Reymond, five years ago, Dr. Sachs went out with modern electrophysiological apparatus, to study the gymnotus in the marshy waters of the Llanos of Calabozo. Returning to Berlin in 1877, he set himself to composing a work on his observations in general, and was about to write specially on the gymnotus, when he lost his life by falling down a crevasse in the Alps of the Tyrol. The monograph now presented gives the results of his studies of gymnotus, with further valuable observations by Prof. Fritsch, who has worked out the anatomy of the animal, numerous specimens of which Dr. Sachs had brought home. M. Fritsch has been able to demonstrate in an almost certain manner the development of the electric organs through metamorphosis of striated muscles.—Results obtained in treatment of phylloxerised vines by the use of sulphide of carbon and sulpho-carbonate of potassium, by M. Henneguy. The vines treated with sulphide of carbon retain their greenness longer than those treated with sulpho-carbonate of potassium, but their branches are shorter and bear fewer grapes.—Observations relative to accidents to vines treated in 1881 with sulphide of carbon, by M. Pastre. These accidents have been mostly due to excess of humidity in a compact clayey soil. The sulphide either remains liquid, or evaporates in too little space; and in both cases (the former especially) it destroys the roots. A less frequent cause is too low temperature. Among rules M. Pastre lays down are these: To treat only well-dried ground, and vines not too much affected; to multiply the holes and diminish the doses; to manure well; to leave off treatment when the temperature is too low.—On trilinear forms, by M. le Paige.—Photometric comparison of luminous sources of different colours, by M. Crova. He uses a spectrophotometer. With two sources (say an electric light and a standard Carcel lamp), so placed that the mean luminosity of the two contiguous spectra is the same, the ratio the intensities of simple radiations of one light to those of the other (corresponding) is represented by a fraction greater than unity in violet, and less in red, and there is one simple radiation for which the ratio is equal to unity. If this radiation be exactly known, the measure of the ratio of its intensities in the two spectra will give *exactly* the ratio of the total intensities. M. Crova realises this with the aid of two Nicol prisms having a quartz plate between them. The apparatus gives very exact results.—Studies on the chemical action of light, by M. Lemoine. He has compared experimentally, from various points of view, the influence of light with that of heat in chemical reactions; considering, more especially, isomeric transformations, and the influence of dissolution, temperature, organic matters, and colour. *Inter alia*, chloride of silver, so sensitive to light, is unaltered by it when dissolved in ammonia. The rate of chemical transformations often varies extremely with the temperature, for light as well as for heat. Presence of organic matters often accelerates a reaction in light and allows of its commencing at a lower temperature. For various substances which heat alone would decompose at low temperatures, the red end of the spectrum seems much less efficacious than the violet end; but in time both lights seem to produce the same effect.—Researches on tropine, by M. Ladenburg.—On a ureometer, by M. de Thierry. This apparatus, for determining the urea in urine of men and animals, is based on the process of decomposition of urine by hypobromite of soda. It is in two parts, one comprising a tube, with ampulla and stop-cock, adapted to a reservoir which communicates through a lateral tube of caoutchouc with the second part. This includes a test-tube, a graduated bell-jar, and a thermometer.—M. Larroque described an instrument for observation of meteors; it is a mirror having the form of a double pyramid.

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